ZOOGOER

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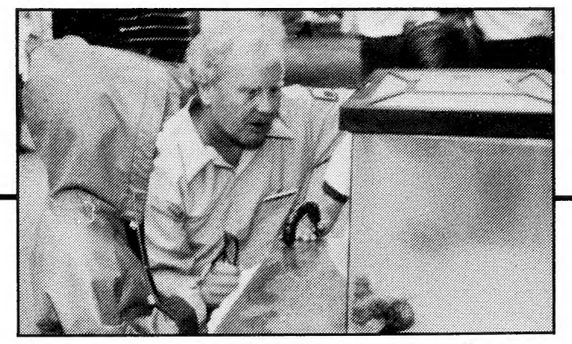
Cover Photos

Front cover: One of the National Zoo's seven red pandas peers from its treetop perch (story, page 4). *Back cover:* Playful and gregarious, the Zoo's prairie dogs are a popular exhibit (page 8). Cover photos by Jessie Cohen, NZP Office of Graphics and Exhibits.



Robinson and friends admire invertebrates.

Dear FONZ Member,

It is almost the holiday season again, an appropriate occasion to wish everyone health, happiness and good zoogoing. News from all parts of the Zoo is of progress and achievement. The construction of Olmsted Walk is going well and it is easy to see how beautiful it will all look when the "red brick road" is complete and we are surrounded by new trees and blossoms.

The development of the invertebrate exhibit is well on track and this will eventually result in an absolutely new kind of zoo experience. Invertebrates are in the news. Recent Smithsonian research, at the National Museum of Natural History, suggests that scientists have underestimated the number of invertebrate species in the world by 15 to 30 times. According to these new estimates only one percent (or less!) of existing species are fishes, amphibians, reptiles, birds and mammals. Zoos throughout the world have, with a few exceptions, been ignoring 99 percent of the animal kingdom up until now. For the vertebrate minority, more than 60 percent of the species are fishes, so we have also neglected a substantial part of animals with backbones. Let us hope we can correct that deficiency with our new aquatic exhibit.

The opening of the animal hospital at the Zoo's Conservation and Research Center in Front Royal, Virginia, is another milestone in our progress. It will soon be matched by the construction of a new hospital here at Rock Creek. This will enable us to match our facilities with progress in animal care and veterinary medicine; our dedicated staff will at last have an operating theater large enough to meet our needs; and there will be access to all parts of the hospital without the encumbrance of a maze of narrow corridors. The old Hospital and Research building will then be remodeled to accommodate the needs of our prestigious Department of Zoological Research. So, we can say goodbye to 1985 with pride and look forward to 1986 with hope and high expectations.

Happy holidays!

Dr. Michael Robinson, Director
National Zoological Park

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Jessie Cohen, NZP Graphics

Sarus crane hatchlings

NEW AT THE ZOO

Two exciting new additions to the National Zoo's animal collection can be seen in the Elephant House: Pandu, a male Indian rhinoceros, arrived last July on extended loan from the San Diego Zoo, and Ryma, a male Masai giraffe, was born at NZP on July 28 (see p. 22).

Other new arrivals to the Zoo include a three-banded armadillo in the Small Mammal House and two Kori bustards, among the world's heaviest flying birds, in the outdoor bird yards.

Zoo births last summer include: two chinchillas, two sugar gliders, and four house shrews in the Small Mammal House; a Siamang gibbon, a lion-tailed macaque, and a white-cheeked gibbon in the Monkey House; a common gallinule and two sarus cranes in the Bird House; and two red kangaroos in the Hoofed Stock area.

LETTERS

Dear ZooGoer,

Please note: Thanksgiving Day is Nov. 28, 1985, not Nov. 21, 1985, as indicated in the current FONZ calendar.

Alice Lage
Alexandria, Va.

For those who missed the correction in the Jan.-Feb. 1985 Zoogoer, *a reminder is in order: Some copies of our 1985 calendar carry an incorrect Thanksgiving date.*

Dear ZooGoer,

Please direct the following questions to the Zoo's Master Plan expert:

1. Is the Olmsted Walk project part of the Master Plan? When will the Plan be completed?

2. Are you still planning to build an aquatic exhibit? What species will be housed there?

Jerry C. Harris
Leesburg, Va.

Gaetano Calise, NZP Assistant Director for Support Services, who is in charge of implementing the Master Plan, has given us the following answers to your questions:

1. The renovation of Olmsted Walk is part of the NZP Master Plan, which is expected to be completed by 1991. A new gibbon exhibit will be built along the renovated Walk in 1986.

2. An aquatic exhibits facility is planned for construction in 1987/88. Species being considered for it include sea otters, South American giant otters, penguins, manatees, and a tropical forest displaying aquatic mammals with appropriate fish, invertebrates, birds, and amphibians.

PARDON OUR DUST

Renovation of the National Zoo's central pathway, Olmsted Walk, began August 19, 1985, on the portion of the Walk between the Ape House and the waterfowl ponds. Work on this segment will be completed by June 1986. Except for a brief closing of the Reptile House in the fall, all exhibits will remain open to the public during the renovation.

Named in honor of Frederick Law Olmsted, the landscape architect and original designer of the National Zoo, the new walkway will be paved with earth-toned, hexagonal stones. Alcoves along the Walk will hold clusters of benches—many of them donated by FONZ members—and will provide space for the display of animal sculpture. Thousands of trees and shrubs, including plants that attract colorful butterflies, will be added to the Zoo landscape along Olmsted Walk.

Renovation of the upper and central portions of the Walk will be completed in 1987 and 1988 respectively.

NATIONAL ZOO CENTENNIAL

Who says nostalgia isn't what it used to be? At the National Zoo, it's better than ever as NZP approaches its 100th birthday on March 2, 1989.

To help put us in the centennial spirit, NZP Historian Billie Hamlet and others will begin sharing with *ZooGoer* readers some favorite tales of the good old days in a regular "Years Ago . . ." column (p. 23).

You are invited to share your own—or your grandparents'—Zoo memories and pre-1930 photographs for possible publication in *ZooGoer* or for display in a Zoo Centennial photo exhibit. Send your tales and photos to NZP Centennial Committee, c/o *Zoogoer*, National Zoological Park, Washington, D.C. 20008.

Jessie Cohen, NZP Graphics

Officially breaking ground on Olmsted Walk renovation are (left to right) FONZ President Roscoe Moore, Smithsonian Assistant Secretaries David Challinor and John Jameson, NZP Director Michael Robinson, and "Smithsonian World" host David McCullough.

The "Other" Panda

Jill Garnett and John Gittleman

When French naturalist Père David discovered giant pandas in March 1869, the creature previously known as "*the* panda" was suddenly relegated to the status of "*lesser* panda." First identified in 1821, the species *Ailurus fulgens* was bumped down to second billing, and to this day, the lesser panda remains obscure to all but the most determined zoogoer.

At the National Zoo, visitors may wonder why there are three red panda yards in three different Zoo areas plus even more at the Zoo's Conservation and Research Center in Front Royal, Virginia. The answer is happily simple: Since 1972, when our red pandas successfully raised their first litter to adulthood, the National Zoo has ranked as the world's leading institution for the breeding and study of this little-known species.

Thanks to management decisions and research by NZP scientist Miles Roberts, more than 100 red pandas have been born at NZP, which has placed the animals in several zoos around the world. The total captive population is still small, however, numbering about 150. Population estimates for red pandas in the wild—they are found in Nepal, Burma, and China—are pessimistic: Red pandas are considered rare and even face extinction in some areas through loss of natural bamboo habitat, a situation that makes the National Zoo's breeding and research efforts all the more critical. The program's success yields a special bonus to regular zoogoers, who yearly see new litters of red panda cubs climbing, wrestling, and trotting around their spacious yards.

A number of customized features help to account for the breeding program's spectacular results:

- relatively large, shaded, and secluded yards, offering grass for the animals to eat and trees to climb and rest in;
- the availability of several nest boxes, giving the mother panda a choice of nesting sites should she become nervous or feel threatened; and
- improved nutrition, including a diet high in fiber and bulk, consisting primarily of bamboo.

With a large number of cubs and adults to observe, researchers have gained a more thorough understanding of the red panda's behavior, reproduction, and requisites for captive management and conservation. Building on these fundamentals, Zoo research since 1983 has focused on maternal care and mother-cub interactions as part of an effort to understand the development and social life of young pandas. Zoogoers may find some of our observations useful in planning visits to see the red pandas (see sidebar, p. 7).

Red pandas mate in January or February, when the male and female may be seen sleeping close to one another in the trees. The male may follow the female, nose to tail, and either sex may give an abrupt bump and wiggle as it scentmarks an area, rubbing rocks or tree limbs with scent from anal glands and urine. Scentmarking occurs more frequently during the mating period, but like giant pandas and many other solitary mammals, red pandas also use scentmarks in the "off-seasons."

Babies are born about four and one-half months after mating, usually in late June or early July. This gestation period may vary by as much as 46 days, however, possibly due to delayed implantation, a reproductive characteristic also found in some bears, weasels, and the giant panda. One to four cubs may make up the litter, although two is the most common number of annual offspring. The female may become more active as the birth approaches, investigating different nest boxes and carrying nest materials such as sticks and leaves into the suitable sites. She may even chase the male away from a nest site.

The cubs are nestbound until

NZP researcher John Gittleman specializes in carnivore research. FONZ volunteer Jill Garnett assisted Dr. Gittleman in his red panda research project, which has been sponsored by the Smithsonian and FONZ.

Ailurus fulgens *researchers hope to revive public appreciation of their favorite species and restore its identity as the* red panda, *thus ridding it of both label and reputation as a "lesser" panda.*

September. The mother makes frequent visits to suckle them in the nestbox, sometimes remaining for hours at a time, particularly when the young are less than a week old. Between visits, she may spend her time resting in a tree or eating bamboo. Her bamboo consumption may be as much as 200 percent more than a non-lactating female's during the three to four-month nursing period. (Furthermore, a lactating female may sometimes be distinguished from other animals in the way she seems to almost gorge herself with two, three, or even four leaves per mouthful, in contrast to the usual leisurely pace of eating one leaf at a time.)

A mother may move her babies to different nest boxes from time to time, perhaps due to stress, nest disturbance, or soiling. By giving the mothers a choice of several nest sites from the outset, the Zoo reduces a mother's stress and prevents possible excessive stereotyped carrying of the cubs, a behavior which can injure or even kill a cub.

Inside the nest box, the young develop slowly. (In fact, red pandas appear to be the slowest developing carnivore for their body size.) Blind and helpless at birth, cubs weigh about one-quarter pound and are covered with a thick buff-colored fur. In the first few weeks, the cubs spend most of their time sleeping, often curled up next to one another. When their eyes open, after about two and one-half weeks, they spring into activity, often pouncing and climbing over each other. By late summer, they are gaining motor coordination, frequently biting and swatting their siblings in play, investigating the nest entrance, and poking their heads into the outside world. When they emerge from the nest box in September, they weigh about two and one-half pounds and look like miniature adults.

Autumn Excursions

The young first venture out of the nests at night and only gradually make appearances during the day. The mother seems to initiate these early excursions, leading the cubs out of the nest box and steering them toward a nearby tree or perhaps to bamboo, where they may take their first bites of solid food. Although the cubs seem uncoordinated on the ground, they quickly become agile climbers.

Mother continues to keep a close watch over the cubs into October, leading them out of the nest box and up the tree. Making sure they do not stray too far or for too long, she comes to their aid when they call (with a sound described as a "wheet") or get into a tangle with the male. She uses a variety of coaxing techniques to get the cubs to follow her away from any perceived danger. Behaviors from this maternal bag of tricks include running by to get their attention, nudging rears, biting necks, and even carrying them away by the nape of the neck—a difficult task when the cubs are half the mother's size!

In the next few months, Mother becomes less protective and the cubs spend more time on their own. They will still follow her in and out of the nest box and up and down the tree on occasion. She may continue to keep a watchful eye out and try, often in vain, to lure the cubs away from possible hazards.

In September and October, the cubs spend a lot of time climbing trees, walking around the yard, and manipulating objects like bamboo. Unlike some carnivores that

D. L. Golobitsh

Regan Parker

Cubs emerge from nest boxes in September and become increasingly active during the winter months.

live in social groups, such as wolves, bush dogs, or dwarf mongooses, the frequency of social play is low compared to solo-locomotor (tree climbing) or object play (batting at twigs or leaves) behaviors. But starting in November and continuing through January, social play—pouncing, wrestling, biting, swatting, and chasing—becomes the order of the day. Mothers vary in the degree to which they become involved: Some are active participants, at times even instigating play, while others ignore play invitations altogether. With the onset of the breeding season in late January and early February, the male may join in and provoke wrestling matches with the cubs. On the other hand, both adults may show more aggression toward the cubs during this period.

It's back to the trees in February, where cubs resume their solitary activities. Mother and cubs still interact, of course, but with less frequency. This pattern continues through April, when the mother separates herself from the others. The cubs may then spend more time with the male and again wrestle with him on occasion.

Cubs are removed from the yards in April or May, giving the mother time to rest before the birth of her next litter. NZP cubs are sent to the Conservation and Research Center, where they either remain for breeding purposes or go on to other zoos. They will become sexually mature at 18 months and generally live from eight to ten years.

We hope this cycle of observations will provide clues as to what can be seen and when in some of those seemingly empty yards. Scientists and visitors alike are fortunate that the Zoo's breeding and research programs have yielded the unique opportunity to learn more about this rare and beautiful animal. □

What's Going on in the Red Panda Yards?

Late January-Early February
Mating Season. Male and female sleep in closer proximity. Male follows female, sniffing her posterior. Both male and female scentmark more frequently.

March-June
Resting in trees—look up! Birds (tufted titmice) may be seen picking fur from a red panda's back or tail for their nests.

Late June-Early July
Birth Season. Female investigates nest boxes, sometimes carrying nesting materials. Female may chase the male away.

June-September
Cubs are nestbound. The male is often the only panda visible. The mother can be seen going in and out of the nest box. She may rest low in the tree or eat bamboo (two or more leaves per mouthful).

Mid to Late September
Cubs make their first appearance outside of the nest box. Cubs will stay close to the mother. Cubs may take their first bites of solid food as they sit with Mother at the bamboo.

October-November
The cubs develop their motor coordination by climbing, walking, and manipulating objects. The mother is very protective of the cubs and uses a variety of coaxing techniques.

November-January
Cubs' social play is on the rise. The mother may also be involved. Lots of action!

January-February
The male may play with the cubs. There may be some hostility between adults and cubs as mating season approaches.

February-May
Cubs are involved in independent activities. Mother-cub interactions are decreasing.

April-May
The mother separates herself from the others. The cubs are removed from the yard and sent to CRC. The male and female often rest in the trees.

A Home Where the Buffalo Roam

Susan Lumpkin

A small town was to be demolished last month and all its inhabitants relocated. But just as the wrecking ball was about to swing, the town won a temporary reprieve.

Is it situated on a former toxic waste dump or in perilous proximity to a nuclear power plant? No, nothing so dramatic. The town sits in the path of planned renovation on NZP's Olmsted Walk and there it will stay, its residents hibernating during most of the construction work this winter.

I'm talking, of course, about the black-tailed prairie dog "town," one of the Zoo's most popular exhibits. Hundreds of Zoo visitors an hour stop to watch the prairie dogs bound in and out of their burrows and listen to their ceaseless chatter that includes yips, chitters, snarls, screams, and yes, barks.

Their habit of barking, in fact, is the reason these stout, short-tailed squirrels are called "dogs;" even their scientific name, *Cynomys*, is from Greek words meaning "mouse dog." Walter Webb, a noted historian of the American West, tells a different story, however: "The Plains squirrel . . . exemplifies what frequently happened when men crossed the line [from East to West]. In the East men were accustomed to squirrels that climbed trees; when they struck the Plains they found that the animal no longer went *up* but *down*. The contrast was more than their minds could grasp, and so they made the Plains squirrel a dog!"

Settlers of the Great Plains took a pretty dim view of the prairie dogs: Man's best friend they were not. As one old westerner put it, "If them things was called by their right names, there wouldn't be one left in the country."

Even though the prairie dogs were misnamed, the old man's prediction almost came true. Always abundant in the West from Montana to northern Mexico, prairie dogs increased spectacularly in the late 19th century. In the early 20th century, the prairie dog population of Texas alone had grown to perhaps 800 million animals. In these numbers, prairie dogs had become agricultural pests. They fed voraciously on crops and cattle pastures, threatening the economic well-being, or so it was thought, of the also-burgeoning human population.

Ironically, human activities were largely responsible for the prairie dog population explosion. As people moved west, they quickly set about trying to eliminate the very predators—foxes, coyotes, bobcats, and ferrets—that preyed on prairie dogs. Bison and antelope, whose competition with prairie dogs for grassy forage also kept them in check, were almost totally exterminated. Domestic livestock introduced by the settlers actually created new habitat for prairie dogs, who prefer closely-cropped vegetation as food. And because 250 prairie dogs can consume as much grass every day as a half-ton cow (all those prairie dogs in Texas translate into about 3 million cows), the fate of the prairie dogs was sealed.

Extermination Program

A fiercely executed extermination program, in which prairie dogs were poisoned, trapped, shot, and just plain persecuted for decades, reduced the number of prairie dogs on the Great Plains by over 90 percent in less than 50 years. In the 1970s, only about 2 million of the 800 million black-tailed prairie dogs of Texas remained. In Kansas, where prairie dog towns once occupied about a million hectares of land, they now fill only 15,000. The near decimation of prairie dogs has also been disastrous for the black-footed ferret, which relies almost exclusively on prairie dogs for food. Only a few ferrets remain, living in remote and closely guarded western sites, their survival too precarious to risk displaying them in zoos.

Two species of prairie dog, although not the black-tailed, are now endangered or vulnerable to extinction, and efforts are being made to protect these former "pests." Thanks to these efforts and, perhaps, to the tenacity of the prairie dogs themselves, the Plains squirrel survives to enliven the West, and, fortunately for easterners, the Zoo.

Dr. Lumpkin, an NZP Research Associate, is currently preparing a book on the management of wild mammals in captivity.

Prairie dog towns, following a political analogy, are divided by topographic and vegetational boundaries into smaller units called "wards." As often happens in human society, however, even though prairie dogs can see and hear others living in adjacent wards, blacktails from different neighborhoods rarely communicate or socialize. Things aren't much better within the wards, where hostile interactions between the families of prairie dogs that comprise a ward are frequent, though rarely fierce.

Scientists refer to prairie dog families as "coteries." The core of the coterie is a group of from two to six genetically related adult females: sisters, cousins, mothers, and daughters. One or sometimes two adult males live and breed with these females. The coterie is completed by their young pups under two years of age.

A coterie's territory is usually passed down from mothers to daughters, while young males generally leave to breed in a coterie of unrelated females. Like the human family, the coterie is the basic unit of black-tailed prairie dog society. And like all normal families, members of coteries have moments of discord throughout their typically cooperative lives.

Discord increases during the breeding season, when two adult males may fight for breeding rights within a coterie. No real winner emerges, however, since both males usually manage to sire young.

Pregnant and lactating females also get testy (and who wouldn't with four or five babies to take care of?). A breeding female shuns company and doesn't allow anyone access to her nesting burrow until her young, born deaf, blind, and hairless six weeks earlier, leave their subterranean nest to join the fun above ground.

Harmony prevails the rest of the year. Young and old, family members play, groom, nuzzle, kiss, and chatter with each other to maintain their close bonds. Young and old, they repel intrusions into the coterie's home territory by prairie dogs from neighboring territories, performing their most predominant display, the "jump-yip," which combines a peculiar little leap with a shrill call.

Prairie dogs also perform a series of alarm calls when they detect an approaching predator. Since these calls are rarely false alarms, all respond by diving helter-skelter into the closest burrow, calling as they go.

Black-tailed prairie dogs cooperate to excavate and maintain the labyrinthine burrow system that provides shelter, protection from predators, and safe nesting sites. Narrow interconnecting tunnels, as deep as five meters and as long as 34, are interspersed with roomier nesting and sleeping chambers that are lined with grass. Each coterie's exclusive burrow system even contains an "excrement chamber." Scores of entrances lead to the underground system or to shorter emergency escape tunnels unconnected to others. The conical mounds that mark the entrances are carefully maintained at various

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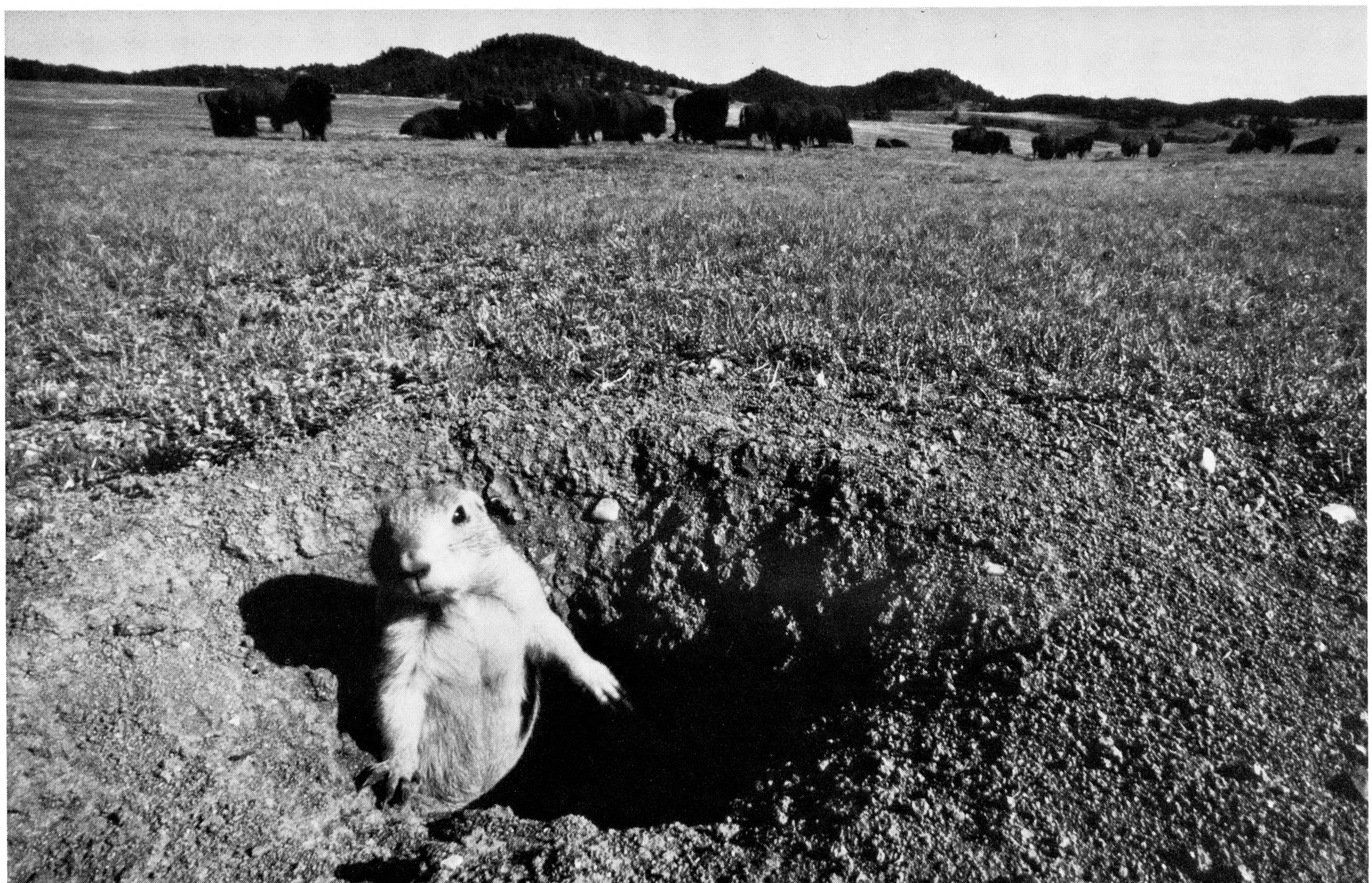
In the West or in the Zoo, if you see one prairie dog, you're bound to see another, or a dozen, or a hundred nearby. Black-tailed prairie dogs are among the most gregarious of all mammals. In the wild, several thousand of them may live in a typical town.



National Geographic

heights to serve as vantage points from which the prairie dogs scan the surroundings. It takes a co-operative family to do all this work!

So where, you are surely wondering, will the Zoo's coterie of prairie dogs live when their "town" is eventually torn down? Where else than with their former Great Plains associates and competitors, in the planned North American Prairie Exhibit, where an enclosure within the bison yard will be built for them. But until then, Zoo visitors can enjoy the prairie dogs' antics in their "reprieved" town at the lower end of Olmsted walk. □

Jessie Cohen, NZP Graphics

In spring and summer the plethora of prairie dog pups, with their inquisitive interest in the people watching them, delight children and adults alike with their antics as they tumble about, often on top of each other and their long-suffering parents.

Milton Tierney

Asian Lions: A Report From the Field

John Seidensticker

The tall, dry grass moved and I was looking into the amber gaze of a lioness 25 feet away. We're too close, I thought. I had traveled thousands of miles for my first glimpse of lions in the wild; experience cautioned I was 50 feet too close. The lioness was squatting sphinx-like, head up, ears cocked, eyes fixed on me. I could make out the raised head of another lioness in the grass to the left and the broken outline of two more raised heads farther on. Beside me, Paul signaled "keep still." There was a rustling of grass in front and beside us, a sudden, explosive *wuu*, and glimpses of rapidly departing tawny forms. My first Asian lions were gone.

John Seidensticker

Two Asian lionesses stalk their prey in the Gir Forest.

Paul Joslin, Assistant Director of the Brookfield Zoo, had organized the expedition that led us to this hillside in India's Gujarat State. Fanned out below us and on the hills around were the teak and acacia of the Gir Forest, home of the last remaining Asian lions. The gray-green of the forest was refreshing and reassuring, but it ended all too abruptly in the dirt brown fields of the plain and not far distant hills. The 1400-square-kilometer Gir Forest is the largest ecologically intact, contiguous tract of land in this region of India; it is reserved primarily for the conservation of native flora and fauna. The abrupt transition from forest to farmland is a harsh exclamation on how isolated and insular wildlife habitat is in India and in all South and Southeast Asia.

My encounter with the lions and their abrupt departure distorted my perception of time. A decade before, while preparing for my first trip to India, I had read E. P. Gee's account of "The Lions of the Gir Forest" and the Indian Board for Wildlife's conservation efforts on their behalf. Asian lions were also the subject of a detailed conservation case study by Lee Talbot, former Director General of the International Union for the Conservation of Nature and Natural Resources, who wrote in 1960 that with enlightened and effective protection and management, the Gir Forest could become one of India's most successful national parks. In many subsequent trips to India, I had wanted to see the lions and the Gir, but I never quite got here. This time, I had been determined. I think it is a privilege, an honor, to be able to see the lions. Now, that tense face of the lioness through the grass is an image fixed in my mind.

Looking below I could retrace our path up the small forested ravine we had so cautiously walked along just a short time before. It normally would have been dry this time of year, but unusually high rainfall during the monsoons had left inviting pools. We noted the tracks of Indian porcupine, small

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Dr. Seidensticker is Assistant Curator of Mammals at the National Zoo.

Overleaf: Asha, the National Zoo's new Asian lioness, gnaws on a bone. (Photo by Jessie Cohen, NZP Office of Graphics and Exhibits)

Imagine the devastation to the grass during the dry season when 25,000 head of local domestic livestock and tens of thousands of additional cattle and buffalo from the region invaded the Forest.

Indian civet, axis deer, and lions where they came to drink from the pools. Following tracks and with great care, we approached this higher ground covered with grass and shrubs. With the lions gone, we examined their bedding site. I wanted to see just what kind of sites these lions normally use to bed down during the day, so we could provide them with similar resting sites within the lion exhibit at the Zoo. (The National Zoo is joining other zoos in India, Europe, and North America in a carefully planned conservation and breeding program for Asian lions.) There were many day beds scattered through the grass. How would I convince the Zoo's conscientious animal keepers and gardeners that, in providing a realistic backdrop for the Asian lions, we should not trim the grass, that we had to create some dusty patches of red rocky earth, plant more shrubs on the terraces and a few trees along a portion of the moat?

Dr. Joslin had returned to the Gir to assess the trend in the number of lions now living there. A direct actual count of the lions can only be completed over a long period of time, and forest cover makes the task especially difficult. So, as a management tool, wildlife ecologists use indirect means to establish the trend in numbers. A decade earlier Joslin completed a pioneering ecological and behavioral study on the Gir lions, an investigation supported by the Gujarat State Forest Department, Bombay Natural History Society, Royal Society, Fauna and Flora Preservation Society, and Smithsonian Institution. In 1970 and 1971, he determined a way to assess changes in lion numbers by counting tracks along one-kilometer stretches of road traversing all habitat types in the Forest. In 755 kilometers surveyed in 1971, there were lion tracks on average in one of every 7.2 kilometers surveyed. The total lion population in the Gir Forest in 1972 was estimated to be about 190 animals. Now, ten years later, we were here with a group of Indian colleagues to repeat the lion trend assessment.

Indian conservationists and natural resource managers initiated many changes in the management of the Gir Forest during the mid– and late 1970s. In the short time we had been here, we saw many axis deer, and they were active during the day. That was an uncommon observation in the past. We hoped this was an indication that India's determined effort to conserve the endangered Gir ecosystem was paying off.

Take this hillside for example. Today it is covered with grass. Imagine the devastation to the grass, during the dry season, when 25,000 head of local domestic livestock and tens of thousands of additional cattle and buffalo from the region invaded the Forest. The Indian and the Gujarat State governments, with the support of Indian and international conservation organizations, took the steps necessary to remove the resident livestock that Maldhari herdsmen grazed in the Forest, and the government sanctioned the construction of a low stone wall around parts of the Forest to prevent encroachment of livestock from beyond the borders. Most of the Maldhari herdsmen were deeded other state-owned lands away from the Gir. A central area within the Gir was managed as a national

John Seidensticker

Domestic water buffalo still graze the edges of the Forest.

park and other areas of the Forest were managed as a wildlife sanctuary. The valuable teak was still harvested, but in ways that were compatible with wildlife conservation needs.

There were two unknowns in all this. For as long as anyone could remember, the Gir lions mostly killed and ate domestic cattle and buffalo rather than native deer and antelope. After all, it is easier to kill a slow moving buffalo than a flighty axis deer, and the buffalo provides more to eat. Would the wild hoofed mammals rapidly increase in numbers in response to the decrease in domestic stock? Would the lions switch prey and quickly learn to hunt them? The abundant grass on this hillside and everywhere we had been in the Forest so far and the abundant axis deer we had seen were good indica-

John Seidensticker

A young male Asian lion relaxes in India's protected Gir Forest (below) while government guards (right) patrol the area's boundaries.

John Seidensticker

tions that this determined conservation effort was working.

The government, through the newly established Wildlife Institute of India, is proposing to undertake new studies of the lions to help fine-tune the management program in the Gir. The studies will also serve as a basis for establishing a second small population of lions in another suitable sanctuary. I was pleased to learn that a close colleague and former visiting scientist at the National Zoo, A. J. T. Johnsingh, would be undertaking the job. With support from FONZ, Dr. Johnsingh and his family spent 18 months at the Zoo's Conservation and Research Center preparing the results of his field study on Asian wild dogs, or dhols, for publication. He had also worked in our research programs at the Center to learn how to follow animals' movements using radio telemetry. This experience will serve him well in the forested habitats of the Gir, where no one has successfully followed the natural movements of a lion day after day.

That is a study for the future; for now, only a careful examination of lion scats collected from all areas of the Gir would tell if the lions had switched prey or if they were mostly traveling to the edges of the Forest to kill domestic stock that still grazed there. And we had many days and many kilometers of roads to walk to obtain an adequate sample to compare with the 1971 data Joslin had collected.

Good news. Joslin phoned after returning home. He had examined all the evidence collected during the survey. There were substantially more signs of lion activity than he found during the 1971 survey, and the lions were eating many more wild hoofed animals than in the past, both promising signs for the Asian lion in its last wild refuge. □

Kings of the Hill

Lynda DeWitt

He's from Knoxville, Tennessee; a small, but aggressive four-year-old named Zike (pronounced "Zeke") who weighs about 350 pounds. She—about 70 pounds lighter and five months younger—comes from Chicago. Her name is Asha. They met in Washington, D.C., late last summer on one of the sultry days when the humidity barely lets the rain fall through. Together ever since, this talk-of-the-town twosome may even start a family.

The thing that makes Zike and Asha so special is that they're Asian lions (*leo persica*), new to the National Zoo. Paler and usually smaller than other lions, Asian lions also have a unique skull structure that distinguishes them as a separate subspecies. Like many Zoo residents, they are endangered animals.

Once ranging from Greece to Northern India, Asian lions are now extinct everywhere except the Gir Forest—a dot on the map in India's state of Gujarat, 300 kilometers northwest of Bombay. Within this 141,200-hectare area, about 200 lions remain. The causes of their decline are the familiar companions of human population pressure: destruction of habitat, overgrazing, and overhunting.

By the late 1800s, these multiple pressures caused the Asian lion population to plummet to 100. A local prince at that time shrewdly protected the lions by convincing hunters and others that only two or three dozen of the animals remained. Slowly, the animals made a comeback to their current level.

The threats of the nineteenth century have abated in the Gir Forest. Part of the Forest is a national park; the remainder is a wildlife sanctuary. Populations of natural prey, including two species of deer and three of antelope, are on the increase. The lions also feed on cattle and domestic water buffalo that encroach on the Forest, despite government efforts to keep them out.

The Indian government is committed to the lions' preservation, but the animals remain extremely vulnerable to extinction. An epidemic or fire could wipe out the wild population overnight; the only survivors would be Asian lions in zoos.

To strengthen these captive populations, the National Zoo cooperates with 37 other zoos worldwide in an Asian lion breeding effort, through the Species Survival Program of the American Association of Zoological Parks and Aquariums. "At this point, the species will benefit most from research aimed at improving methods of managing the Gir population," said John Seidensticker, assistant curator in charge of large cats at the National Zoo. "But," Dr. Seidensticker added, "the option of reintroducing zoo-born animals into the wild is also being explored."

There are many obstacles to placing zoo lions in the wild. "The most difficult problem is doing it in a way that enables the animals to establish a social structure," Seidensticker said. "You can't just put one back, and then another

Lynda DeWitt is a Washington, D.C.-based freelance writer.

one back. Also, the animals must be behaviorally competent; they must be able to fend for themselves. Finally, there is the problem of finding a politically acceptable area where human neighbors will accept the introduction of a big cat."

Whether due to politics, poaching, or other factors, an attempt to establish a second lion population in India has already failed. In 1957, two females and a male were released in the Chandrapabha Forest in north central India. Although the lions produced several offspring, the small population died out within a few years.

Family Groups

Asian lions are social cats that live in extended family groups, called prides. In India, lion prides are made up of about seven or eight individuals; in Africa they may have as many as 35 members. At the core of each pride are the females—mothers, daughters, sisters, and nieces who live, breed, and die in their natal pride.

Males usually leave the pride before their third birthdays. They travel with brothers and peers like nomads until they successfully take control of a pride.

The new males often increase their reproductive success by killing the existing cubs. Since females are not sexually active until after their young are weaned, they enter estrus and are ready to mate within days or weeks of the loss of their cubs. In east Africa, where individual prides have been studied for many years, the length of a male group's tenure in a pride is directly related to the number of males in the group. Two males reign for about 18 months, while groups of three males stayed two to three times as long.

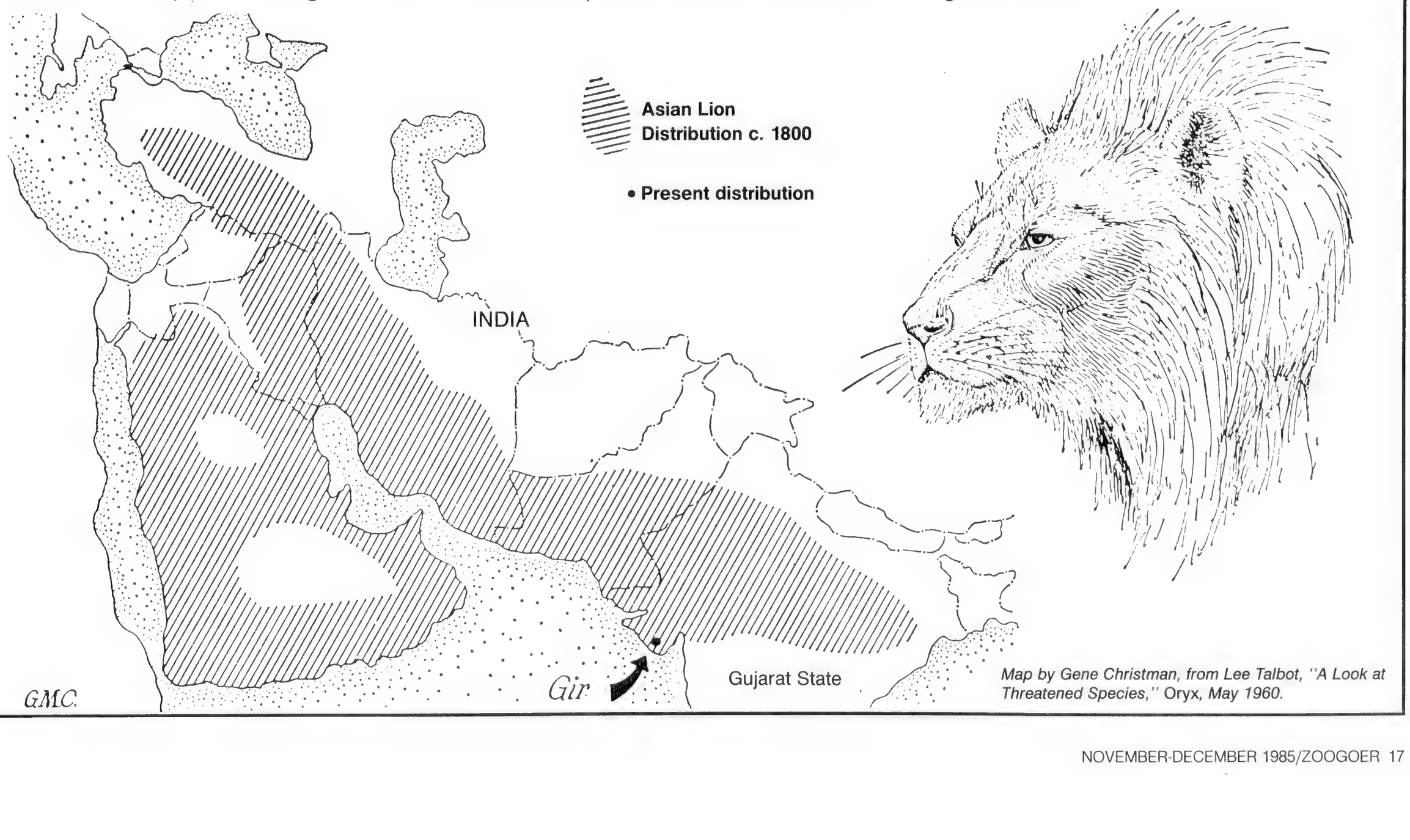
Once the males take over a pride, they rely on the females to do most of the hunting. Lions sometimes hunt alone, but their efficiency increases when they hunt in groups.

Growls and snarls often accompany mealtimes as the lions compete for portions of their large prey. If food is scarce, serious battles ensue, and cubs and lionesses may starve to death. In extreme conditions, prides may disintegrate until even females roam alone or in pairs.

Environment plays a key role in determining all aspects of an animal's social behavior, and Africa is the only environment where lions have been extensively studied. While zoologists assume that Asian lions behave in similar ways, few details of their lives are known.

If all goes as planned, Zike and Asha will form the foundation of a future Asian lion pride at the National Zoo, which zoologists will study. To help make room for the new additions, NZP transferred several Atlas lions to the Madrid Zoo.

Maintaining an entire pride would be good for the Asian lions as well as for the Zoo visitor, since the Mann Lion-Tiger Exhibit was designed to accommodate whole prides. Few will ever see the wild lions of the Indian forest, but the Zoo's open-air island may offer a sight that is rarer still: a glimpse into the ever-evolving life of the pride itself. □



Map by Gene Christman, from Lee Talbot, "A Look at Threatened Species," Oryx, May 1960.

A Bird's Best Friend

text and photos by Pat Vosburgh

Like the other 146 species of waterfowl, the South American coscoroba swan is thickly feathered with down beneath its contour feathers.

From the scales of reptilian ancestors, through eons of evolution, nature created the seemingly fragile feather, unique to one order of creatures—the birds.

Feathers enable birds to fly and provide a year-round wardrobe that keeps the wearer dry in rain, warm in winter, and cool in summer. They wear well and if damaged can easily be repaired with simple pressure from the beak. If a feather is lost, another grows in its place; and at least once a year, most birds get completely new outfits by molting.

For strength, beauty and usefulness, feathers would baffle even top-flight human designers. The delicate-looking feather is in reality one of nature's strongest and most durable creations. The barbed branches in its vanes interlock to form a strong structure for flight, insulation, and protection. The lightness and strength of feathers enable seasonally migratory birds to make their awesome flights twice a year.

How many feathers does a bird have? Not surprisingly, ornithologists, whose curiosity knows no bounds, have set out to count. One patient scientist counted 25,000 feathers on a whistling swan; hummingbirds have about 950. Feathers grow from a

FONZ member Pat Vosburgh has been a volunteer Zoo photographer whose pictures appeared in the NZP "World of Birds" exhibit.

follicle in the skin and are made of the same keratin that forms a bird's bill, claws, and scales on the legs.

Even the colors of feathers are remarkable, affected by diet, season of the year, and sex, as well as by genetics. Red, orange, brown, and yellow are pigment colors that may be affected by food. A carotene-rich shrimp diet maintains the wild flamingo's vivid coral; yellow and orange also come from carotene, a substance found in many plants.

Other colors, especially blue, are an optical illusion caused by the structure of the feather: a layer of colorless cells reflects or absorbs the rainbow hues of the spectrum as light falls on the feather and bounces back to the eye. The green of a parrot feather is created by yellow pigment overlaid with colorless blue-reflecting cells.

Iridescent feathers have tiny ridges and platelets that reflect colors according to the angle of light, creating the apparent intermittent brilliance of a hummingbird's throat—an effective courting device—and the iridescent green head and neck of male mallard ducks. Both male and female ducks of various kinds sport a patch of iridescent violet-blue in the wings, called the speculum.

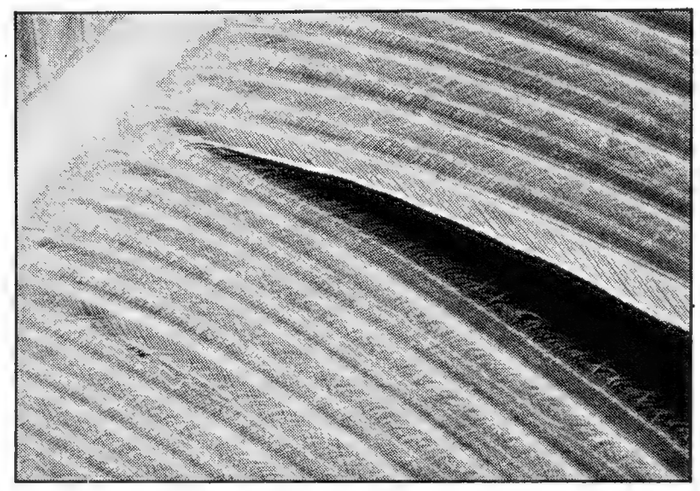
Each bird wears several kinds of feathers. Most important to flight are stiff, strong *contour feathers* on the wings and tail. Woodpeckers and chimney swifts have especially stiff tail feathers that help them prop against the surfaces of trees and chimneys. Other contour feathers cover the body; their base is usually downy.

Softer than contour feathers are *semi-plumes*, which have a long shaft and "down vanes"—a strong, soft network of barbed webs on either side of the shaft. Hidden beneath contour feathers, semi-plumes offer protective padding and insulation.

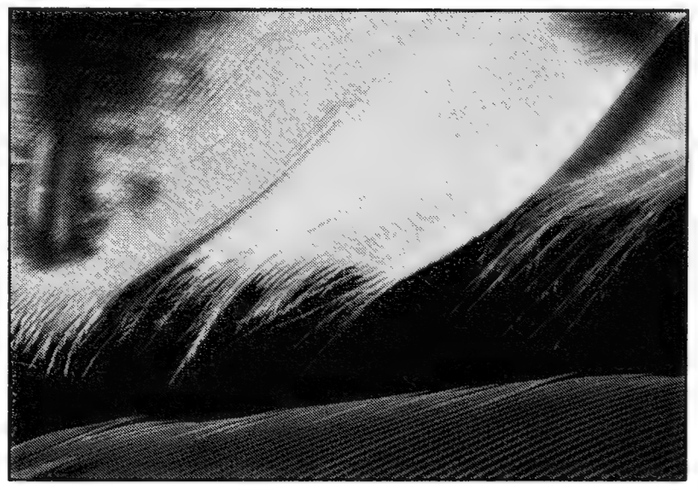
Even better insulation is provided by *down*, small fluffy feathers that are especially well developed in water birds. Nearly all downy feathers have a smaller after-feather for additional protection. In most birds, down is concealed under other feathers. The stealthy owl, however, has mufflers of down fringing its flight feathers to ensure silent approach to prey. The wings of the mourning dove and several other birds, however, whistle with each downstroke.

Another type of feather, the *bristle*, is barbless and is sometimes

A male house sparrow displays its not-yet-perfect black courting bib. Like several other birds, it changes plumage for mating displays without the trouble of molting; the grayish brown feather tips of winter wear away to reveal the black bib.

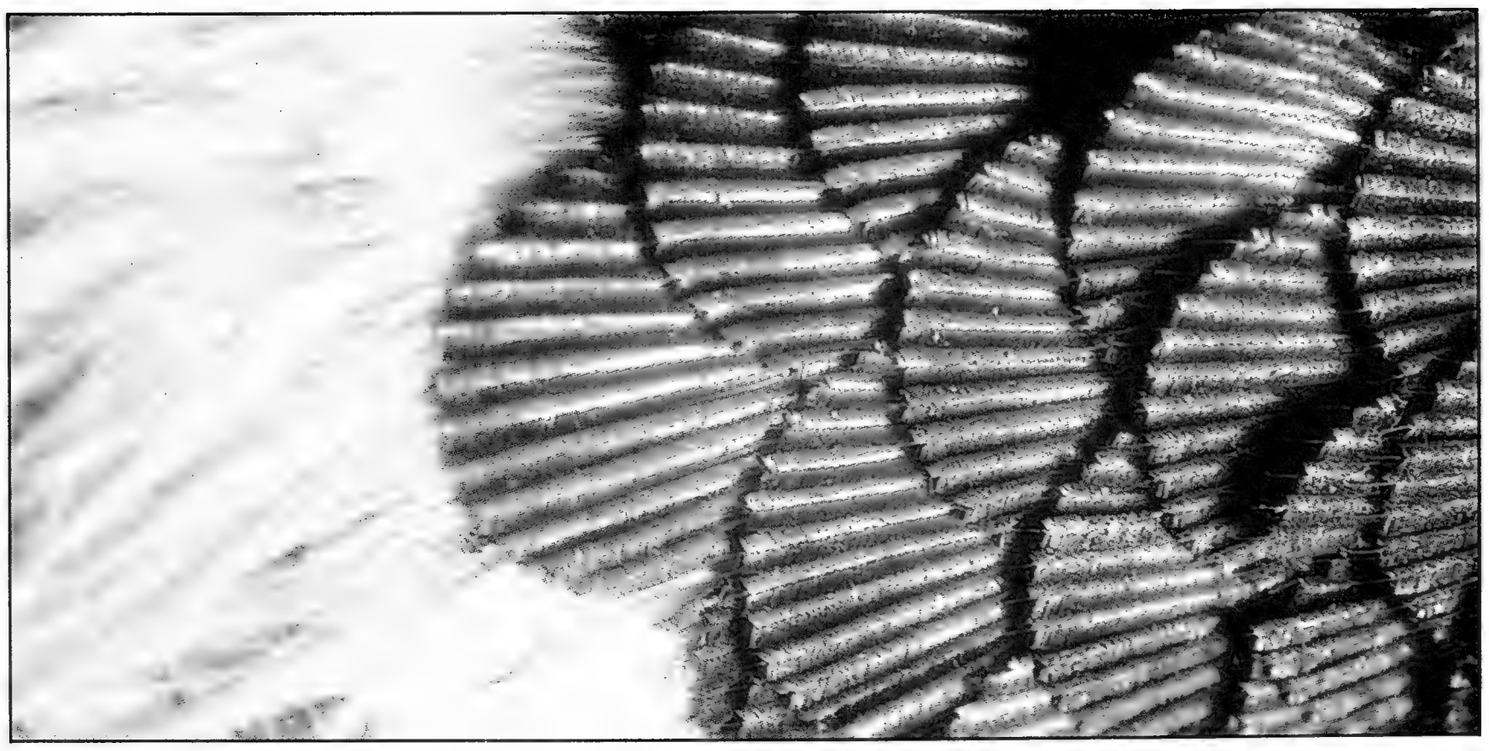


Greatly magnified, a split feather shows the tiny barbs and almost invisible barbules that interlock the web of all feathers. Birds repair splits by smoothing the barbs to relock them.



The hard-edged wing feather of the military macaw (top) contrasts sharply with the barn owl's soft flight plumage. Macaws are known as noisy fliers, while the owl's fringed wing feathers ensure silent flight.

Bristles—barbless feathers resembling hair—serve as eyelashes on the Abyssinian ground hornbill.



When magnified, the feathers of a Costa hummingbird reveal the tiny ridges that create iridescence.

Canada goslings wear the heavy down that characterizes young waterfowl. These birds can swim and forage 24 hours after hatching.

To maintain their vivid feather colors, the National Zoo's American flamingos receive a special high-carotene diet that includes carrot juice and paprika. Because flamingos are filter-feeders, keepers put their food in a shallow pool. Holding their bills parallel to the bottom of the pool, the birds strain out the water and sweep in food with their tongues.

mistaken for hair. The upper and lower eyelids of some birds bear bristles, called—reasonably enough—eyelashes; the barn owl has bristles on its toes; and bristles on the bases of the bills of flycatchers and redstarts form a net to help the bird catch insects on the wing.

Another hair-like feather, the *filoplume*, is a long, fine shaft with a few barbs at the tip. Seldom visible, filoplumes occur around the base of other feathers, providing sensory information about total feather movement.

Other feather modifications include elongation of head feathers, giving the tufted titmouse its topknot and the hoopoe its crest. Some owls have a tuft on each side of the head; so does the horned lark.

A bird can adjust the position of its feathers through bands of muscle that can not only raise and lower the feathers but also draw them together, twist them, or combine these actions. This ability is the basis of flight: tail feathers act as braking and steering mechanisms; wings provide support and steering. The downward wing stroke propels the bird forward; on the upstroke, the primary feathers fringing the wing twist to prevent drag. The bird has complete control over its primaries in flight; the feathers in this "hand" section separate like fingers to maintain control.

Naturally, such valuable tools merit the best of care. In birds, this means frequent preening—using an oil gland at the base of the tail to smooth, dress, and waterproof their feathers. Some species lack this oil gland. One waterbird, the anhinga or snakebird, must "hang out" its wings to dry following underwater pursuit of prey.

In one form of preening, called "anting," some songbirds introduce crushed or live ants into their

feathers, apparently to get rid of parasites. Some have been seen to use beetles, mealworms, even coffee grounds, vinegar, or mothballs instead of ants. Other forms of grooming include dips in water and dust baths. One ornithologist reported seeing house sparrows, fanatic bathers, taking a dust bath in a bowl of sugar!

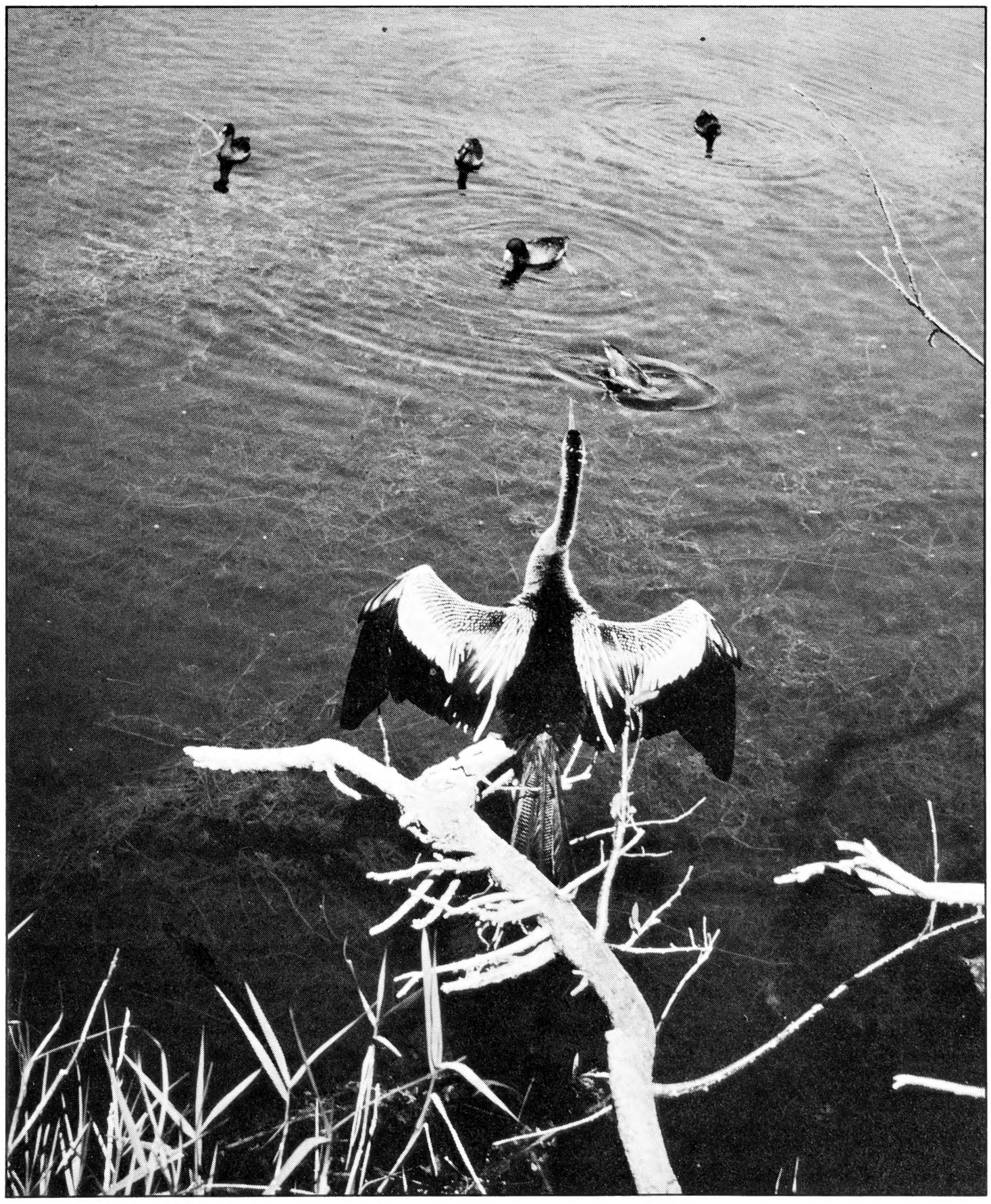
Despite their durability, feathers eventually become worn and must be replaced by an annual or semi-annual molt. Most birds molt symmetrically, maintaining their flight capability; but many water birds, including male ducks, lose all their flight feathers at one time and are effectively grounded. They are then said to be "in eclipse"; they resemble females and hide from possible enemies in swamps and marshes until their new flight feathers have grown.

Some birds change colors and patterns seasonally without molting. Snow buntings, streaked brown and black in winter, become black and white in summer as brown feather tips wear off and reveal the different colors beneath. Similarly, the throat feathers of the male house sparrow wear away during the winter to reveal the black bib of his spring courting dress.

Patterned feathers help to camouflage many water and wading birds—the dark stripes on the American bittern and the streaked backs of small waders; patterns also break up the silhouettes of killdeers and semi-palmated plovers, making them hard to distinguish at a distance.

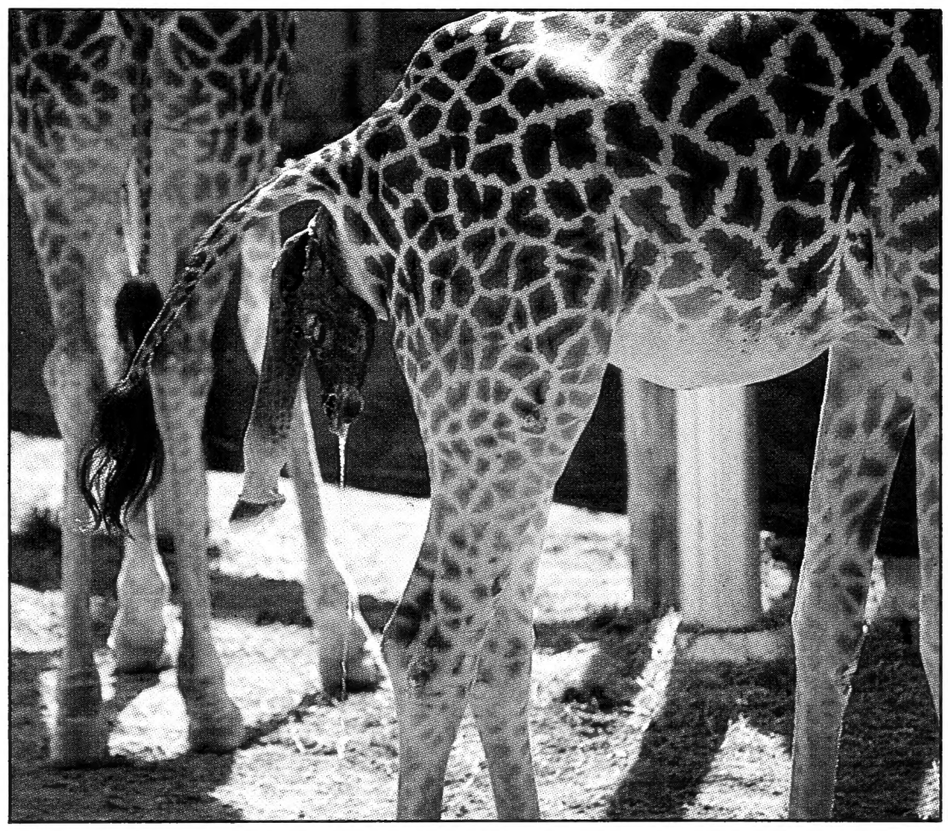
Frequent visitors to the Zoo's bird exhibits enjoy observing the seasonal changes in birds' feathers as well as in their behavior. For whether the avian apparel is a humble sparrow's courting bib or a proud peacock's spectacular fan, feathers are a marvel to behold and one of nature's great wonders. □

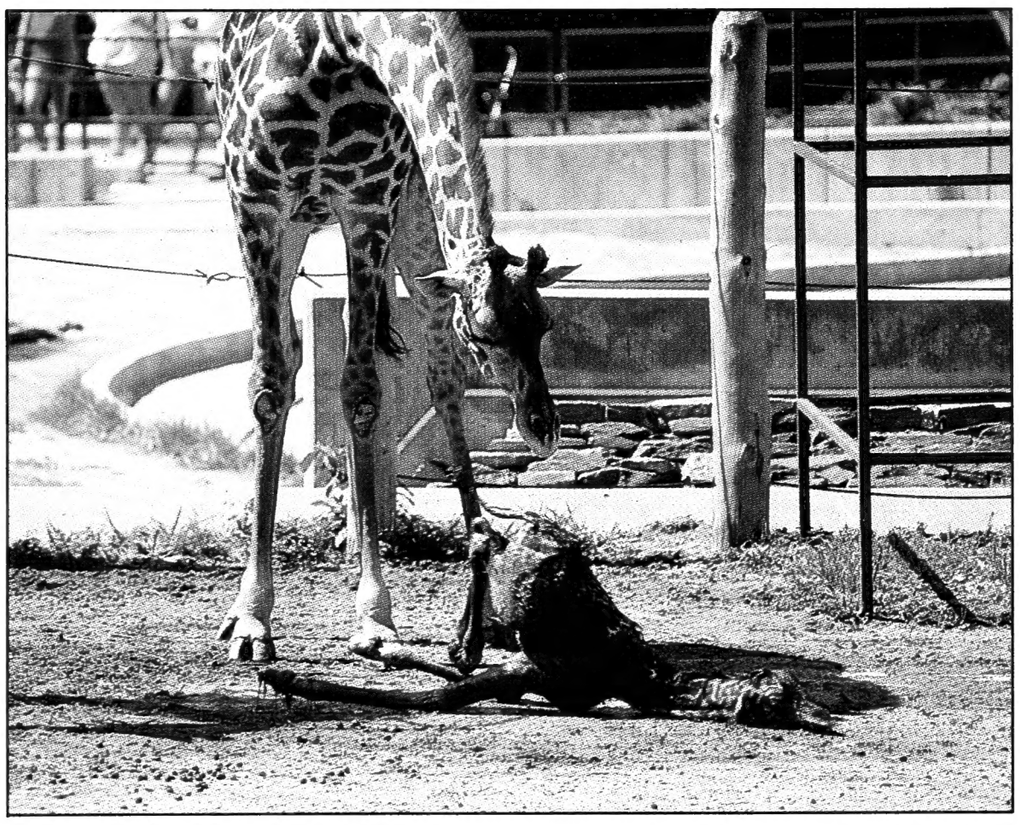
Making a threat display, an osprey brakes with its stiff tail feathers and spreads the primary feathers ("fingers") of its wings to adjust altitude.

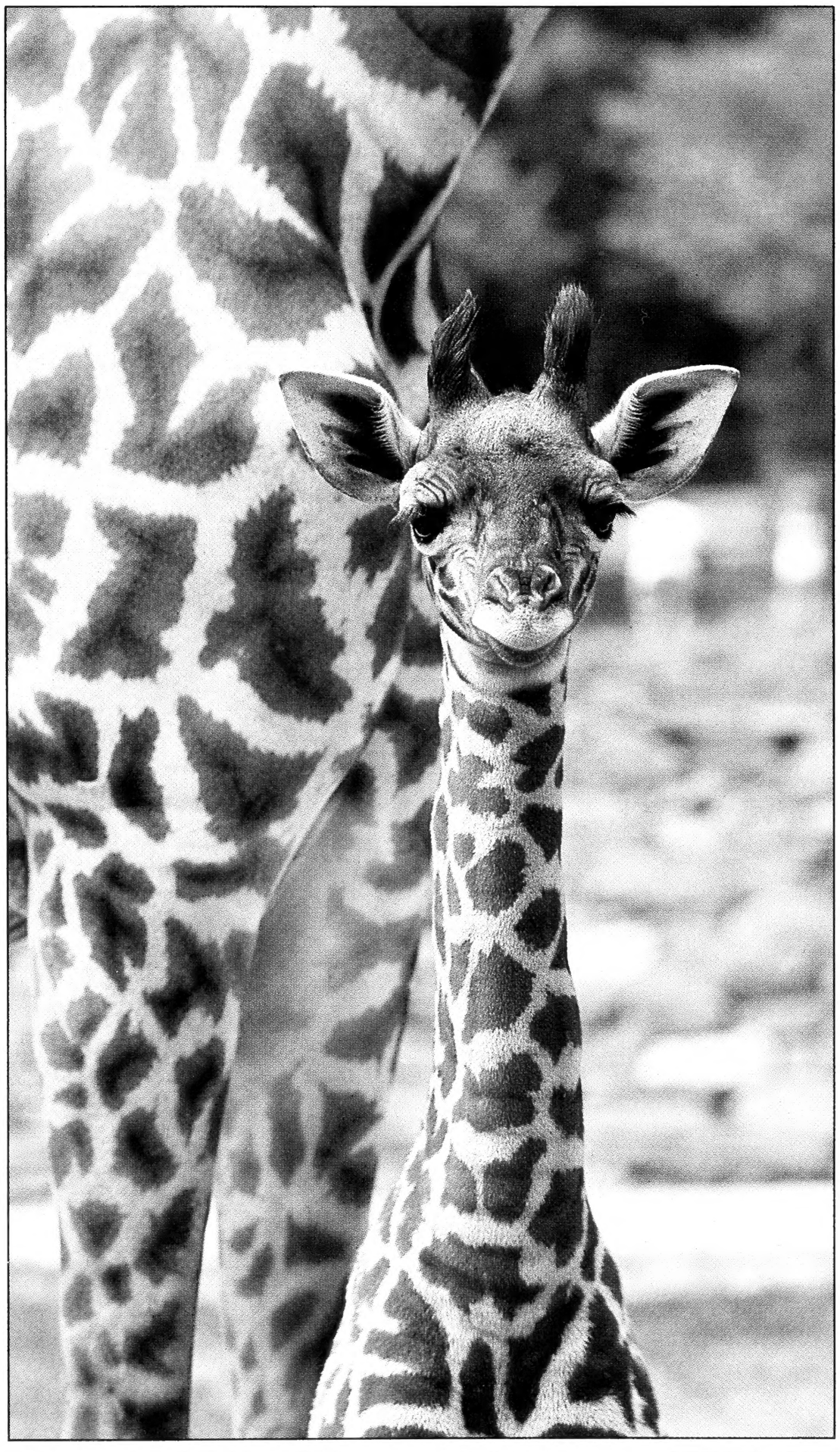


An anhinga, fresh from an underwater dive, hangs out its wings to dry in the Florida sun.

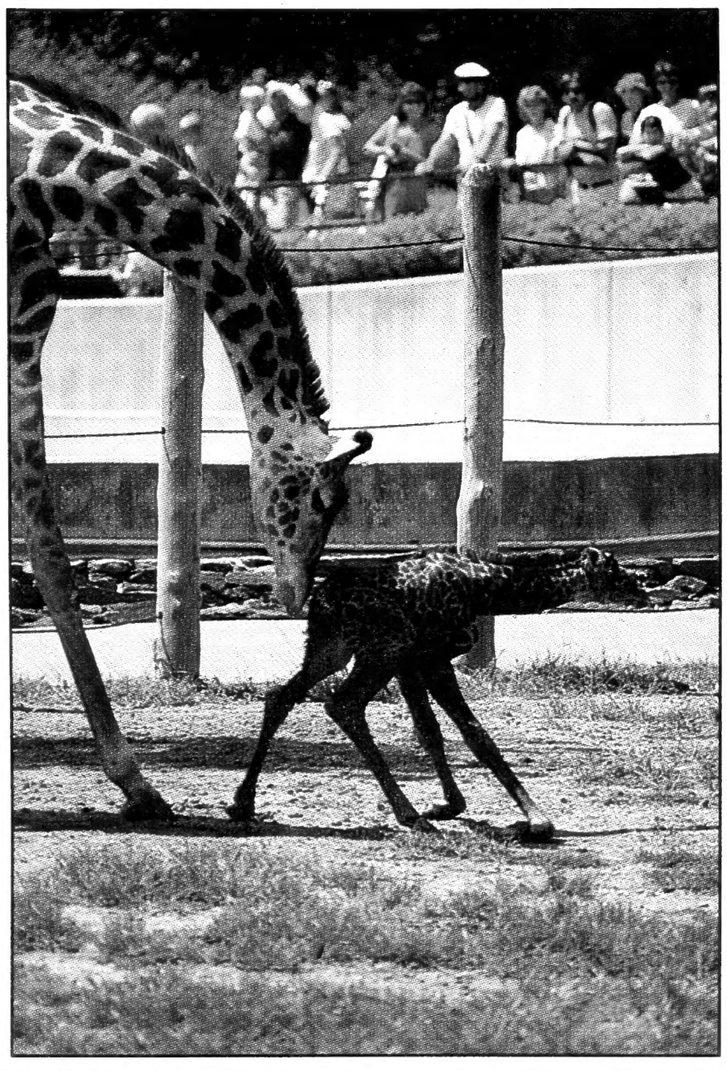
THE BIRTH OF RYMA







Fewer than 15 minutes after his hoofs first appeared (above left), Ryma, the Zoo's newest Masai giraffe, was walking—with a gentle nudge from his mother (right). FONZ member Jim Lynch recorded Ryma's birth in this four-photo series. Six weeks later, Ryma posed for a more formal portrait (far right) by the Zoo's staff photographer Jessie Cohen.



Years Ago . . .

When We Had a Thylacine

Billie Hamlet

A what? A thylacine! This odd creature—the world's largest carnivorous marsupial—lived at the National Zoo until 1909. Today, it may be extinct.

The thylacine (THĪ-la-seen) is also called Tasmanian wolf, Tasmanian tiger, and *Thylacinus cynocephalus*, which means "pouched dog with a wolf head." It does resemble a dog in a way. An adult is about 22 inches high at the shoulder and more than four feet long from nose tip to tail base. Its color can be yellowish-brown or tawny gray, with dark brown bands of varying width across its back, rump, and tail.

In 1902, the National Zoo received a female thylacine as a gift from Dr. F. W. Goding, U.S. Consul in New South Wales. On arrival, she was discovered to have three young in her pouch—a spectacular windfall! Although one of the youngsters died nine days after arrival, the other two thrived.

William Temple Hornaday, director of the New York Zoo, had previously turned down Goding's gift and soon regretted his decision. "Hornaday bought for $125 the next thylacine that came from the Hagenbacks [animal dealers] a few months later," reported William Bridges in *Gathering of Animals*.

Unfortunately, neither zoo was to have thylacines for long. In the hope of maintaining a breeding pair, the National Zoo obtained a male in 1904; but four months after he arrived, the adult female died.

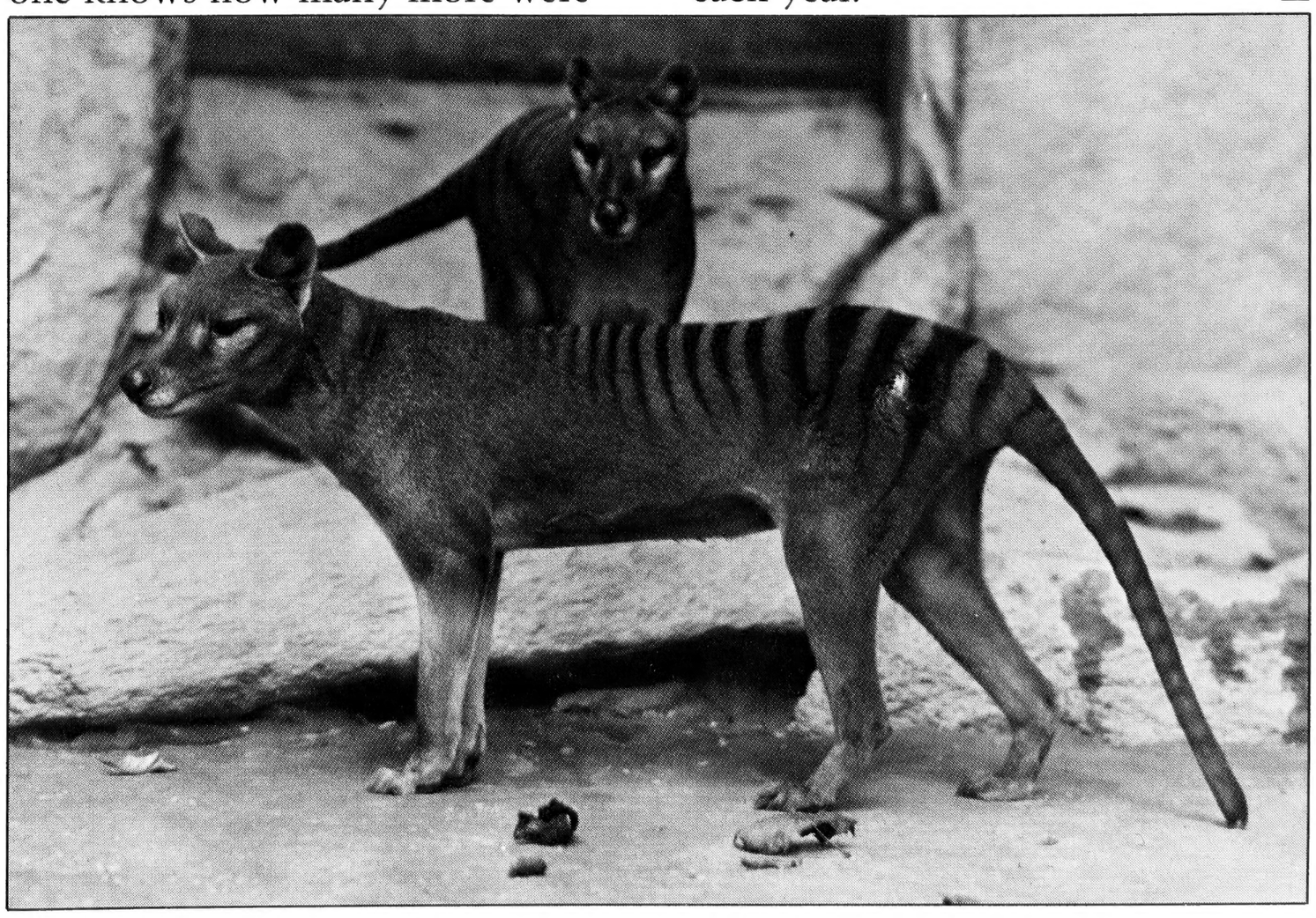
One of the pouched young, a female, remained in the NZP collection for seven years. Although she lived with the Zoo's male for five years, they did not breed. Her longevity record was bested only by the London Zoological Society's thylacine, which lived for eight years, dying in 1931. That animal may be the last of its species ever seen. Certainly it is the last seen outside Tasmania.

Being carnivorous and preying on sheep, the thylacine's days were numbered among sheep-farming Tasmanians. From 1888 to 1909, 2,184 thylacines were destroyed for government bounty, and no one knows how many more were killed for private bounty.

The last known shooting of a wild thylacine occurred in Mawbanna in 1930. Since then, tracks, hairs, and some 300 thylacine sightings have been reported—but no reports have been verified.

The thylacine was classified as endangered in 1970 and was noted as "possibly extinct" in 1975 by the Convention on International Trade in Endangered Species.

Yet some hope remains that the thylacine exists. In 1966, a 647,000-hectare reserve was established in southwestern Tasmania, where thylacines once were plentiful. But, like the abominable snowman, none have been captured or photographed, so hopes for the thylacine's existence grow dimmer each year. □



In the early years of this century, these two thylacines lived at the National Zoo. Today, the species is probably extinct.

When the Zoo's prairie dogs awaken from this winter's hibernation, they'll see a lot of changes! (p. 8)

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